Chapter 7: Risk

"*The ability to see that some things cannot be foreseen is a very necessary quality.*"[34]

Chapter 5 focused on the returns on alternative investments in replacement real property and investing in permanent funds. The second dimension in the investment decision criteria is risk. Effective investment criteria should consider both: return and risk.

Risk is the impact of forces that cause the actual return of an investment to deviate from that which was expected. Not all risks are negative. For example, historically, the trusts have benefited from greater than expected real price appreciation in commodity prices and asset values.

Fire, weather and insect damage are all well recognized physical risks to forestry and agricultural investments. In estimating expected investment return, the department adjusts expected revenues for these types of risks by incorporating fall-down factors based on historic probability of their occurrence. For example, the department can estimate the probability of loss from windstorms on timber investments in a geographic area of the state from historical records. But the actual levels of loss during any given year are unknown ahead of time.

Other risks like the impact of global warming or new environmental regulations cannot be easily predicted based on historical information. The investments made on behalf of the trust are also subject to many market and political risks.

Sometimes increased yield on investments is associated with increased risk. The department seeks to make prudent investments, which will produce yields commensurate with the level of risk. For example, the department's Asset Management Council directs acquisition of commercial properties to enhance income and to reduce risk. The council noted that, "Acquiring institutional grade (commercial) investments that will generate stable, current income with low to moderate levels of risk."

7.a Trust Management and Risk:

The department historically has been relatively conservative with regard to risk. The trust doctrine gives the department the legal duty to make the resources it manages

[34] Jean Jacque Rousseau, an 18th century French deistic philosopher

productive of revenue for both current and future trust beneficiaries. Because of these responsibilities, the department avoids putting the trusts' assets at long-term risk for short-term gain.

The trust doctrine also requires the department to act prudently in making investments. This means, among other things, avoiding undue risk, and avoiding tortious acts where prudent, etc.[35]. Trust law also holds a trust manager to a stricter standard of accountability than a normal investor. Thus, the department has appropriately tended to move slowly and deliberately in its investment decision-making process and to be conservative in the investments it makes on behalf of the trusts.

7.b Unique Risk vs. Asset Class Risk:

U**nique risks**[36] stem from the fact that many of the perils that surround an individual investment are peculiar to that investment and perhaps its immediate neighbors. In forestry investment, fire is an example of a unique risk. Only those properties actually burned will be impacted, returns from other forest investments will not.

The second type of risk is **asset class risk**. Asset class risks affect all investments within an asset class in a similar direction although often to different degrees. Market risk is an example of asset class risk. The section on permanent fund investment in chapter 5 of this report described how the market prices of fixed income investments are impacted by interest rate shifts. The interest rate risk is an asset class risk of the fixed income investment.

Each asset class is subject to its own set of risks, both positive and negative. The Asset Management Council has addressed specifically the element of risk in its asset acquisition criteria to guide the department in acquiring replacement properties. The focus of guidance is to help the department avoid properties with characteristics that have undue risk (e.g., sites with pollution problems). The guidance is not designed to address the risks that may impact a portfolio as a whole.

7.c Minimizing Risk through Diversification:

While risk is an unavoidable part of investing, a prudent manager will take steps to minimize both the risk to individual investments and the overall risk to the total portfolio. Diversification is one way to reduce overall risk to the portfolio. Even a little

[35] See page 4 of the Forest Resource Plan, "The Department's Legal Obligations – The Trust Mandate"
[36] Unique risk may be called unsystematic risk, residual risk, specific risk, or diversifiable risk.

diversification can provide a substantial reduction in risk, but there are limits to how much risk can be reduced by diversification.[37]

Diversification works because returns on different investments do not move exactly together. An unexpected loss on one investment or class of investments can be averaged in with the overall return. On many occasions a decline in the return from one investment can be canceled out by a rise in the return from others. The department is able to reduce risk by diversification both within and between asset classes.

One of the policies adopted by the Board of Natural Resources in the 1988 Transition Lands Policy plan, reads:

"*The department will actively pursue a program of diversified property investments to reduce the risk of variability of income*".

The department can reduce unique risk by diversification within the asset class. Continuing our forestry example, if a trust investment portfolio were primarily comprised of a single block of timber or blocks within an area, that trust might face unnecessary risk from fire, windstorm, insect, and other risks that could impact most or all of the assets of that trust. The trust's risk can be reduced be diversifying its timber holdings into a number of geographically diversified forest investments around the state.

The Asset Management Council has directed the department to acquire diverse agricultural holdings noting that owning, "Properties in diverse agricultural communities, precipitation zones, agrarian infrastructures, and commodity markets generally reduce(s) market risk and variation in annual returns."

Diversification between asset classes can further reduce overall portfolio risk. By using a large portion of the funds available to purchase replacement property to acquire commercial and agricultural investments the department is reducing asset class risk.

7.d Measuring Risk and Asset Correlation:

Standard deviation is the conventional measure of historical risk within an asset class. The lower the standard deviation, the lower the average deviation from the average yield over the period.

Statistically, how closely investments move together over time is called their correlation. Investment returns that move in tandem have a correlation coefficient of +1. Investment returns that always move proportionately in opposite directions have a coefficient of –1. Investments whose returns are completely independent would have a correlation

[37] See Chapters 8, 9, &10 of Principles of Corporate Finance by Richar A. Brealey and Stewart C. Myers for detail.

coefficient of zero. The less correlated investment classes are, the greater the potential reduction in risk from diversification.

The standard deviation and correlation for annual nominal returns for the four asset classes discussed in this report are shown in Table 17. These are not the standard deviations or correlations for the actual assets managed by the department and State Investment Board, rather, they are industry averages as compiled in an investment feasibility study done for the California Public Employees' Retirement System Investment Office, Real Estate Unit.[38]

Caution is needed in drawing conclusions about granted trust management using these numbers. For example, the standard deviation of annual nominal return on bonds is not directly comparable with that to beneficiaries since Table 17 includes the price as well as coupon and realized capital gains revenue. Most of the deviation shown in Table 17 is the result of price changes in the value of the bonds. Likewise, the correlation between bonds and the three real property investments may reflect price changes.

The highest standard deviation in total return was for timber and bonds, while agricultural and real estate had much lower standard deviation or risks.

Table 17: Standard Deviation and Correlation between asset classes (1970-1998)

Asset Class	Standard Deviation	Correlation				
		Inflation (CPI)	Bonds	Agricultural	Commercial	Forestry
Inflation (CPI)	3.3%	1.00				
Bonds	11.5%	(0.53)	1.00			
Agricultural	8.5%	0.57	(0.51)	1.00		
Commercial	5.9%	0.41	(0.26)	0.09	1.00	
Forestry	14.9%	0.26	(0.41)	0.54	(0.06)	1.00

The greatest opportunity to benefit from diversification would appear to be between bonds and all three of the real asset classes, which are negatively correlated. This negative correlation is probably due in part to the fact that while the return on bonds is negatively correlated with inflation, it is positively correlated with the three real property asset classes.

Forestry and commercial investments were negatively correlated while forestry and agricultural investments were positively correlated. This indicates that diversification out of timber into commercial investment will probably reduce overall risk more than diversification out of timber into agricultural.

[38] "Agricultural land Investment Feasibility" Prepared for: California Public Employees' Retirement System Investment Office, Real Estate Unit, By Ernst & Young LLP November 5, 1999.